

### Abstract

A Spin Valve GMR and Spin Filter SVGMR configuration where in the first embodiment an important buffer layer is composed of a metal oxide having a crystal lattice constant that is close the 1<sup>st</sup> FM free layer's crystal lattice constant and has the same crystal structure (e.g., FCC, BCC, etc.) . The metal oxide buffer layer enhances the specular scattering. The spin valve giant magnetoresistance (SVGMR) sensor comprises: a seed layer over the substrate. An important metal oxide buffer layer (buffer layer) over the seed layer. The metal oxide layer preferably is comprised of NiO or alpha-Fe<sub>2</sub>O<sub>3</sub>. A free ferromagnetic layer over the metal oxide layer. A non-magnetic conductor spacer layer over the free ferromagnetic layer. A pinned ferromagnetic layer (2<sup>nd</sup> FM pinned) over the non-magnetic conductor spacer layer and a pinning material layer over the pinned ferromagnetic layer. In the second embodiment, a high conductivity layer (HCL) is formed over the buffer layer to create a spin filter -SVGMR. The HCL layer enhances the GMR ratio of the spin filter SVGMR. The third embodiment is a pinned FM layer comprised of a three layer structure of an lower AP layer, a spacer layer (e.g., Ru) and an upper AP layer.